

Implementation Guide

hp StorageWorks Enterprise Backup Solution with EMC Legato NetWorker 7

First Edition (December 2004)

Part Number: 377493-001

This guide provides recommendations and best practices for system administrators setting up an Enterprise Backup Solution using EMC Legato NetWorker 7. For additional information related to online storage, refer to the *HP StorageWorks SAN Design Guide*.



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About this guide

This implementation guide provides information to help you configure EMC Legato NetWorker 7 on an HP StorageWorks Enterprise Backup Solution.

Intended audience

This guide is intended for use by system administrators implementing an EBS configuration who are experienced with the following:

- Tape backup technologies and tape libraries
- SAN environments and backup software
- Fibre Channel technology

Prerequisites

Before you install and configure EMC Legato NetWorker, make sure you have:

- Reviewed the EBS Compatibility Matrix
- Properly installed and configured your EBS hardware per the *HP StorageWorks EBS Design Guide*

Related documentation

In addition to this guide, HP provides the “EBS123” web site: <http://www.hp.com/go/ebs>, with corresponding HP StorageWorks Enterprise Backup Solution information. The following is some of the content found at the “EBS123” web site:

- *EBS Compatibility Matrix*
- *HP StorageWorks EBS Design Guide*
- *HP blueprints*
- *HP StorageWorks SAN Design Guide*
- *HP Storage Products*
- *HP Storage Strategy for the Adaptive Enterprise*
- *HP Storage Customer Assistance and Contact*

Conventions

Conventions consist of the following:

- [Document conventions](#)
- [Text symbols](#)

Document conventions

The document conventions included in [Table 1](#) apply in most cases.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Figure 1
Key and field names, menu items, buttons, and dialog box titles	Bold
File names, application names, and text emphasis	<i>Italics</i>
User input, command and directory names, and system responses (output and messages)	Monospace font COMMAND NAMES are uppercase monospace font unless they are case sensitive
Variables	<monospace, italic font>
Website addresses	Underlined sans serif font text: http://www.hp.com

Text symbols

The following symbols may be found in the text of this guide. They have the following meanings.



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.



Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Getting help

If you still have a question after reading this guide, contact an HP authorized service provider or access our web site: <http://www.hp.com>.

HP technical support

Telephone numbers for worldwide technical support are listed on the following HP web site: <http://www.hp.com/support/>. From this website, select the country of origin.

Note: For continuous quality improvement, calls may be recorded or monitored.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP storage web site

The HP website has the latest information on this product, as well as the latest drivers. Access storage at: <http://www.hp.com>. From this web site, select the appropriate product or solution.

HP authorized reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-282-6672
- In Canada, call 1-800-863-6594
- Elsewhere, see the HP web site for locations and telephone numbers: <http://www.hp.com>.

Introduction

1

Overview of Enterprise Backup Solutions

Properly setting up a Fibre Channel storage area network (SAN) backup solution can be challenging. Typically components are purchased at different times and arrive separately, or the components are purchased from different vendors. Each piece of hardware arrives with its own documentation for setup and deployment. These challenges may require additional time and money. HP is committed to keeping these challenges to a minimum by providing the *HP StorageWorks Enterprise Backup Solution Design Guide* and this implementation guide.

History

HP engineering teams have developed a comprehensive approach to ensuring that all hardware, firmware, and software components are properly fitted into an Enterprise Backup Solution (EBS). The teams test the supported configurations and they have developed many best practices to follow when setting up your own EBS. The teams also test backup solution software and provide many best practices to ensure that your EBS runs at optimum efficiency.

Documentation goal

This guide is intended to address integration recommendations for issues you may encounter when setting up your EBS, and to provide some suggestions for best practices. A few of the guide's highlights are:

- The guide covers areas where special configuration issues and best practices that may not be covered in the vendor documentation will help in your goal of setting up an efficient EBS.
- This guide does not provide specific documentation for installing and configuring your data protection software.
- Within this guide HP points you to the appropriate documentation when necessary.

Refer to the *HP StorageWorks Enterprise Backup Solutions Design Guide* for proper hardware setup and configuration.

The configuration rules and recommendations are made based on the solution integration testing conducted by HP. Certain limitations apply and are noted where applicable.

Solution features

EBS with EMC Legato NetWorker® integrates data protection and archival strategies with disk and tape storage subsystems across multiple platforms and operating systems located on the same SAN. This solution provides for the interconnection of multiple heterogeneous servers to multiple tape backup devices using dynamic device sharing technology.

The servers can share one or more HP StorageWorks tape libraries interconnected through HP StorageWorks Fibre Channel SAN switches. Online storage, such as the HP StorageWorks Disk Array XP, Enterprise Virtual Array (EVA), Modular SAN Array 1000, and others, can also be attached to the switch.

To determine the compatible hardware components for this system, go to the HP EBS Compatibility Matrix at:

<http://www.hp.com/go/ebs>

Solution components

- Server(s) containing Fibre Channel Host Bus Adapter(s)
- RAID Array Storage
- Fibre Channel SAN Switch(es)
- Internal Network Storage Router(s) for HP tape libraries, such as the integrated FC interface controllers HP StorageWorks E2400-160 and E1200-160
- External Network Storage Router(s) for HP tape libraries, such as the HP StorageWorks M2402 and N1200
- HP StorageWorks Interface Manager Card(s)
- HP StorageWorks Tape Library
- Data Protection software, such as EMC Legato NetWorker

Supported operating systems and platforms

The Enterprise Backup Solution (EBS) with EMC Legato NetWorker supports several operating systems and platforms.

Refer to the EBS Compatibility Matrix for a complete list of operating systems and platforms. Refer to the *HP StorageWorks EBS Design Guide* for detailed instructions on SAN configuration of each OS.

EMC Legato NetWorker

EMC Legato NetWorker provides data protection software for multiple heterogeneous servers and operating systems to utilize and share backup devices while leveraging Fibre Channel speed.

The EMC Legato NetWorker backup devices can be a single tape drive, tape libraries, or disk arrays (JBOD, RAID, NAS), allowing the flexibility of backups of data to a secondary disk in addition to regular tape devices.

EMC Legato NetWorker protects the critical business data of more than 31,000 enterprise customers worldwide by simplifying, centralizing, and automating backup and recovery operations across UNIX, Windows, Linux, OpenVMS, and NetWare platforms. Built upon an open, highly scalable architecture, NetWorker enables corporate, government, and educational organizations to standardize on one application to provide complete, fast and reliable data protection in the largest data centers and the smallest branch offices, resulting in lower downtime costs, less management overhead, and greater ROI of storage resources.

EBS-specific requirements

The following list of configuration requirements are EBS specific and they may not be available in the Legato installation guide:

- EBS configurations with EMC Legato NetWorker, Sun Solaris 9, and Sun SG-XPCI2FC-QF2 HBAs require additional manual configuration steps. See the [“Installation best practices”](#) section of this document for additional information.
- Configure servers with EMC Legato NetWorker, IBM AIX and HP Secure Path 2.0d SP1 (Cambex driver version 1.5.24.1) as Legato storage node only. Use non-Secure Path configurations on EMC Legato NetWorker NSR servers.
- Microsoft Windows 2003 StorPort environments require Microsoft QFE837413 or later revision of the *Storport.sys* driver and have special configuration considerations. See the [“Installation best practices”](#) section of this document for additional information.

Supported configurations

Figure 1 shows a diagram of a basic storage domain configuration. Refer to the EBS Compatibility Matrix and the *HP StorageWorks Enterprise Backup Solution Design Guide* to be sure your system components are included in the compatibility matrix, and that your hardware is properly configured.

Basic storage domain configurations

The basic EBS storage domain may consist of a heterogeneous connection of multiple servers sharing multiple libraries and RAID array storage systems.

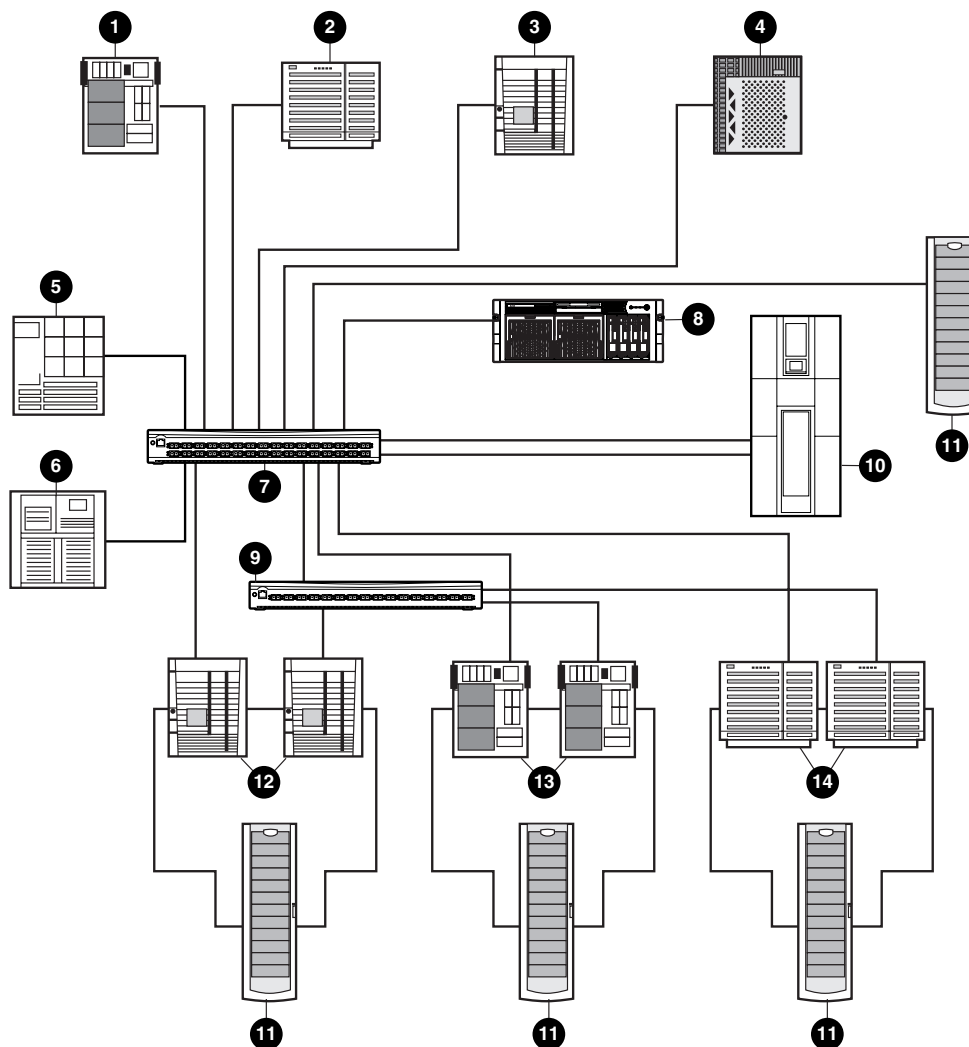


Figure 1: Basic storage domain configuration

- | | |
|----------------------------|--|
| ① HP ProLiant server | ② HP PA-RISC server |
| ③ HP AlphaServer | ④ Sun Enterprise server |
| ⑤ IBM RS/6000 server | ⑥ Supported Intel third-party server |
| ⑦ FC SAN Switch | ⑧ HP NAS |
| ⑨ FC SAN Switch | ⑩ HP tape library with integrated router |
| ⑪ RAID array storage | ⑫ HP Alpha TruCluster server |
| ⑬ Microsoft Cluster Server | ⑭ HP Serviceguard cluster |

Installation and configuration

2

Before installing your backup software, refer to the *HP StorageWorks EBS Design Guide* for assistance in setting up your hardware.

Installation checklist

To ensure that all components on the SAN are logged in and configured properly, you must be able to answer yes to each of the following questions:

- Are all hardware components at the minimum supported firmware revision (HBA, Fibre Channel switch, router, tape library drives, tape library robot)?
- Is the minimum patch level support for the OS installed?
- Is the minimum supported HBA driver loaded on the host?
- Is the tape library online?
- Are all tape and robotic devices mapped and configured on the router?
- Is the router correctly logged into the Fibre Channel switch?
- Is the host server correctly logged into the Fibre Channel switch?
- If the Fibre Channel switches are cascaded or meshed, are all Interswitch Links (ISL) ports correctly logged in?
- Are the router and the host server HBA in the same switch zone (either by World Wide Name (WWN) or Port)?
- Does the host server detect all of the tape and robotic devices intended to be used?

Note: HP recommends host-based zoning; create a zone for each host adding the alias or WWPN for the server and the devices the server is intended to access.

Installing EMC Legato NetWorker

After all components on the SAN are logged in and configured, the system is ready for the installation of EMC Legato NetWorker. Refer to the EMC Legato NetWorker installation guide or contact Legato customer support for detailed installation procedures and requirements.

Note: HP recommends that you remove any other backup software currently configured on your system before installing EMC Legato NetWorker. Other backup software, tape device applications that are part of the OS, and SAN or system management software can negatively affect how EMC Legato NetWorker installs and functions.

Configuring multi-drive robotic libraries

Configuring EMC Legato NetWorker to work with multiple drive robotic libraries is accomplished by making associations between the robotic library's media drives, robotic arm, and EMC Legato NetWorker. EMC Legato NetWorker reports serial numbers of drives, however manual configuration of the drives is required and accommodated by the `jbconfig` command.

With EMC Legato NetWorker v7.0 and above, changing an existing library configuration can be accomplished via the `jbedit` command. Unlike the `jbconfig` command, which requires manual entry of all library drive elements for all storage nodes, `jbedit` allows for the addition and/or deletion of single library drive elements.

EMC Legato NetWorker library configuration caveats

Configuration of libraries

As of version 7.1.2 EMC Legato NetWorker does not employ serialization or a configuration wizard for automation libraries. You should check with Legato to ascertain if this functionality has been provided in future releases. The tools Legato provides to assist are command line `inquire` and `jbconfig`, which display devices and configure libraries respectively.

Multiple servers can be configured to successfully “see” all devices from the OS perspective. However, when servers are configured with access to all devices, there is the possibility that EMC Legato NetWorker may display or list the devices in different sequence on the servers. Therefore, when a user performs the Legato `inquire` command to distinguish devices in a library, the user has to inspect the inquiry string information (particularly serial number) to ensure there is a proper alignment of devices between all servers that are sharing the library.

When you execute the EMC Legato NetWorker `inquire` command, the displayed devices and corresponding “Bus/Target/Lun” combination may not appear in the same sequence on all servers. Use the following procedure to ensure proper alignment of library devices configured with Legato `jbconfig`:

1. Execute the EMC Legato NetWorker `inquire -l` command on each server and capture pertinent device information (server name, device special file, device type, serial number).

- As a planning tool you should build a table from the `inquire` command output, sorted by serial number similar to the following example:

```
*****
HUL3C04854 acdc.entlab.ice scsidev@2.0.0:HP      Ultrium 2-SCSI      |Tape, /dev/rmt0.1
HUL3C04854 anya.entlab.ice scsidev@72.0.0:HP     Ultrium 2-SCSI F43W |Tape, /dev/rmt/c72t0d0BESTnb
HUL3C04854 duloc.entlab.ice scsidev@4.5.0:HP     Ultrium 2-SCSI F43W |Tape, /dev/ntape/tape15_d1
HUL3C04854 oslo.entlab.ice scsidev@7.5.0:HP     Ultrium 2-SCSI F43W |Tape, \\.\\Tape8
HUL3C04854 raptor.entlab.ice scsidev@0.6.0:HP    Ultrium 2-SCSI F43W |Tape, /dev/nst8
HUL3C04854 sunfire01.entlab.ice scsidev@3.0.0:HP Ultrium 2-SCSI F43W |Tape, /dev/rmt/0cbn
*****
HUL3C04875 acdc.entlab.ice scsidev@2.6.1:HP      Ultrium 2-SCSI      |Tape, /dev/rmt11.1
HUL3C04875 anya.entlab.ice scsidev@78.0.1:HP     Ultrium 2-SCSI F43W |Tape, /dev/rmt/c78t0d1BESTnb
HUL3C04875 duloc.entlab.ice scsidev@4.2.1:HP     Ultrium 2-SCSI F43W |Tape, /dev/ntape/tape10_d1
HUL3C04875 oslo.entlab.ice scsidev@7.2.1:HP     Ultrium 2-SCSI F43W |Tape, \\.\\Tape3
HUL3C04875 raptor.entlab.ice scsidev@0.3.1:HP    Ultrium 2-SCSI F43W |Tape, /dev/nst3
HUL3C04875 sunfire01.entlab.ice scsidev@3.5.1:HP Ultrium 2-SCSI F43W |Tape, /dev/rmt/11cbn
*****
HUL3C04881 acdc.entlab.ice scsidev@2.0.1:HP      Ultrium 2-SCSI      |Tape, /dev/rmt1.1
HUL3C04881 anya.entlab.ice scsidev@72.0.1:HP     Ultrium 2-SCSI F43W |Tape, /dev/rmt/c72t0d1BESTnb
HUL3C04881 duloc.entlab.ice scsidev@4.5.1:HP     Ultrium 2-SCSI F43W |Tape, /dev/ntape/tape16_d1
HUL3C04881 oslo.entlab.ice scsidev@7.5.1:HP     Ultrium 2-SCSI F43W |Tape, \\.\\Tape9
HUL3C04881 raptor.entlab.ice scsidev@0.6.1:HP    Ultrium 2-SCSI F43W |Tape, /dev/nst9
HUL3C04881 sunfire01.entlab.ice scsidev@3.0.1:HP Ultrium 2-SCSI F43W |Tape, /dev/rmt/1cbn
*****
```

- Using the planning tool as described above, execute the EMC Legato NetWorker `jbconfig` command to configure your library by aligning devices by serial number shown in your data collection.

Installation best practices

- Follow the HP StorageWorks EBS Compatibility Matrix and the *HP StorageWorks Enterprise Backup Solution Design Guide* found on the HP web site: <http://www.hp.com/go/ebs>.
 - The matrix of hardware, software, and firmware is updated monthly and helps customers and support personnel maintain their EBS environment. It is not necessary to immediately update an environment to the latest revision on the matrix. However, you should be aware of updates and changes if you experience any problems that may be related to newer or older software, driver, and/or firmware versions.
 - The design guide describes currently supported EBS hardware configurations and how to efficiently and effectively provide shared tape library backup in a heterogeneous SAN environment.
- Use `jbconfig` to manually configure the drives.
 - Use the EMC Legato NetWorker `inquire` command, which reports the devices in order.
 - Be sure all of your devices show up in the detected hardware list.
 - Be sure all of your devices show up under the proper robotics device.
 - Be sure your backup account login has administrator privileges if you want to back up everything.
- Use only ASCII characters in the EMC Legato NetWorker installation path. If non-ASCII characters are used the installation succeeds, but EMC Legato NetWorker services may start incorrectly.
- Limit rebooting during backup windows.
 - Rebooting hosts in an EBS environment during backup windows may cause job failures and configuration errors.
 - When rebooting is necessary, verify that the tape device order has not changed for the host when maintenance or reboot is complete. If devices are not in the same order you configured for this host with EMC Legato NetWorker `jbconfig`, use `jbedit` to put devices back in the original order for that host.
- Before beginning, be sure you have downloaded all of the latest Legato patches from the Legato web site: <http://portal2.legato.com/resources/downloads/networker.cfm>.
- Disable the Removable Storage Manager Service on Windows to allow EMC Legato NetWorker to control the library and drives. This reduces the potential for device conflicts.

Additional steps when using Sun Solaris 9 with Sun SG-XPCI2FCQF2 HBAs

EBS configurations with EMC Legato NetWorker, Sun Solaris 9, and Sun SG-XPCI2FCQF2 HBAs require additional manual configuration steps.

The Sun Solaris driver for HBA -XPCI2FC-QF2 (X6768A) may not display devices on LUNs, however the `st` (Solaris standard tape) driver connects to tape devices on LUNs resulting in logical devices being created out of order. In this configuration the EMC Legato NetWorker `inquire` command, which validates the presence and configuration order of tape and robotics, will not discover devices in Enterprise Backup Solutions.

Rather than configuring tape devices in the logical order of the device specific files, (i.e. `"/dev/rmt/0cbn, /dev/rmt/1cbn, /dev/rmt/2cbn` etc.), ensure that the devices on this server are aligned with the same logical device as defined by other servers on the SAN.

To avoid I/O errors and conflict of the library's robotics source versus targets when multiple servers share a device, perform the following steps before executing `jbconfig`:

1. Perform integration procedures as defined in the EBS Design Guide (see section for the x6768 HBA).
2. From a terminal command line execute `cdi_inq -f` on each device special file (`/dev/rmt/0cbn`, `/dev/rmt/1cbn` etc.).
Example: `cdi_inq -f /dev/rmt/0cbn`
3. Collect device serial number for each device.
4. For each Sun Solaris server with the x6768 HBA perform steps 1, 2 and 3 above.
5. If all servers in this EBS have the x6768 HBA go to next step. Otherwise, if you have servers in the EBS with out the x6768 HBA, execute the EMC Legato NetWorker `inquire` command on them. The `inquire` command also displays the device serial number. Use this information to align and order devices during the `jbconfig` procedure.
6. Configure the Legato library jukebox using the serial numbers collected in Step 3 above, making sure you align the correct device special file from each server based on serial numbers and/or the output information from EMC Legato NetWorker `inquire` on a server with an HBA different from the x6768.

EMC Legato NetWorker and Windows 2003 StorPort configuration requirements and limitations

EBS configurations that include Windows 2003 servers, StorPort mini-port Fibre Channel drivers (either Emulex or QLogic), and EMC Legato NetWorker have the following configuration requirements and limitations:

- All EBS/StorPort configurations require, at minimum, the version of the *StorPort.sys* driver distributed by Microsoft as QFE837413.
- With QFE837413 installed, the Windows 2003 Device Manager displays tape drive logical device handles in inverse order.

For example, if the Windows 2003 server is connected to a four-drive tape library, Windows Device Manager displays the first device as Tape3, the second device as Tape2, the third device as Tape1, and the fourth device as Tape0.

When configuring the tape library for use with EMC Legato NetWorker (via `jbconfig`), you must specify the devices in inverse order (i.e., the first device in the library is `\\.\TAPE3`, the second device is `\\.\TAPE2`, etc.). This issue has been corrected with the *StorPort.sys* driver released by Microsoft in QFE838894.

- Windows 2003 servers running *StorPort.sys* do not support the EMC Legato NetWorker commands `jbconfig`, `jbedit`, or `inquire`. These commands must be run from a different server in the configuration that is configured with legacy *SCSIport.sys* drivers. This issue is present in EMC Legato NetWorker 7.1.1 and 7.1.2 and will be fixed in a future release.
- Devices that are hosted by a server running StorPort drivers cannot be edited in the EMC Legato NetWorker Administrator GUI. This issue has been corrected with the *StorPort.sys* driver released by Microsoft in QFE838894.

- If the shared library includes two or more Fibre Channel Interface Controllers (i.e., an MSL6060 library with two embedded e1200-160 Interface Controllers), use the persistent binding feature of the HBA driver to fix the target ID for each of the Interface Controller's World Wide Port Name (WWPN).

Note: This feature is built into the Emulex driver and is available via the */putilnt* utility. QLogic drivers from HP have only recently included this functionality. Contact your local support representative for help in acquiring this feature.

Bind the WWPN of the Interface Controller that is hosting the robot and/or first two tape drives to the lowest available target ID; the WWPN of the Interface Controller associated with the next pair of tape drives next, and so on. *StorPort.sys* discovers tape devices in ascending order, beginning with the lowest Bus/Target/LUN value. Binding the Interface Controller WWPNs to target IDs in this manner ensures that tape devices are discovered in ascending order beginning with Tape0.

Updating from previous versions of EMC Legato NetWorker

Updating from EMC Legato NetWorker 5.x to EMC Legato NetWorker 7

Due to a media database bug in EMC Legato NetWorker 6.0, first update to EMC Legato NetWorker 6.0.1 or later before updating to EMC Legato NetWorker 7 to prevent the possibility of erroneous save records.

Note: You cannot update a EMC Legato NetWorker 5.5.x server directly to EMC Legato NetWorker 7. First update to EMC Legato NetWorker 6.0.1 or 6.1.x, and then update to 7. This ensures a proper conversion of the online indexes. Legato recommends backing up EMC Legato NetWorker metadata prior to updating to release 6.x, and again before updating to 7.

Updating EMC Legato NetWorker servers and storage nodes

Storage nodes running EMC Legato NetWorker 7 are not compatible with EMC Legato NetWorker servers running releases earlier than 6.0. Update the EMC Legato NetWorker server before updating storage nodes.

Note: A EMC Legato NetWorker 7 server supports a 6.x storage node.

Performance and tuning

To analyze speed and performance, it is necessary to examine the entire backup process as a system. Although many factors contribute to the overall performance of the system, there are five main factors that must be thoroughly understood to determine the maximum performance in any specific situation. These factors are:

- **Storage Connection**—For the EBS, this is Fibre Channel connection.
- **Block Size Allocation**—Block size differences on a storage node can result in recovery failure.
- **File (Data) Compression Ratio**—The amount of compression has a direct impact on the rate at which a tape drive can read/write data.
- **Source Disk and File Systems**—Data source, local disk, RAID array storage, file system type, and volume type.
- **Tape Drive**—In the EBS, these are the various types of tape drives in HP StorageWorks Libraries.

Block size allocation

Differences in SCSI hardware limitations between UNIX and Windows can lead to compatibility problems. If you use both operating systems, you must determine a common block size acceptable to both platforms.

To determine the block size allowed, type:

```
scanner -v device_name
```

where `device_name` is the device name as defined for the server. The block size is the record size of the device, in bytes, included in the following output:

```
scanner: volume id 2641870849 record size 98304
```

Change the block size by setting the appropriate environment variable to the greatest common value for both systems:

1. From the Windows Start menu, select **Settings > Control Panel**, and then click **System**.
2. Click the **Advanced** tab.
3. Click **Environment Variables**.
4. In System Variables, click **New...**
5. In the Variable Value text box, type:

```
NSR_DEV_BLOCK_SIZE_DEVICE_TYPE value
```

where:

- **DEVICE_TYPE** is the backup device type available to the EMC Legato NetWorker server.
- **value** must be a multiple of 32 KB, with a minimum value of 32 KB. The syntax for the **DEVICE_TYPE** value is all uppercase with underscores replacing blank spaces. For example, a device displayed in EMC Legato NetWorker as “4 mm 20 GB” would be listed as:

```
4MM_20GB
```

6. Click **OK** three times to save the settings and exit.
7. Restart EMC Legato NetWorker for the changes to take effect.

File (data) compression ratio

HP tests show that not all data can be compressed equally. The compression ratio affects the amount of data that can be stored on each tape cartridge, as well as the speed at which the tape drives can read or write the data.

Table 2 shows typical compression ratios of various applications.

Table 2: Typical File Compression Ratios

Data Type	Typical Compression
CAD	3.8:1
Spreadsheet/Word Processing	2.5:1
Typical File/Print Server	2.0:1
Lotus Notes Databases	1.6:1
Microsoft Exchange/SQL Server Databases	1.4:1
Oracle/SAP Databases	1.2:1

Source disk and file systems

In the past, tape performance was typically identified as a bottleneck. However, tape performance has now surpassed many of the source systems available today. Items to take into account when calculating desired throughput and performance metrics are:

- Source Hardware (disk subsystems)
- Source Filesystem status

It is essential that the hardware you use for disk or online storage be able to adequately provide data for the application online along with the backup application and tape devices.

In environments deploying large tape subsystems using HP StorageWorks ESL9000 Series Libraries and Ultrium 460 tape drives, disk subsystems become an increasingly important performance component. One ESL9595 with 16 Ultrium 460 tape drives can easily maintain 500 MB/s of total system throughput. In this scenario, it is recommended that your disk subsystems be able to maintain a 2:1 ratio of disk-to-tape throughput. That would be approximately 1 GB/s of disk I/O required to stream data to one ESL9595 tape library.

The impact of file systems on backup performance can be significant. Highly fragmented systems only allow disk and tape subsystems to run at a fraction of stated or desired performance. In some cases they can cause a device rated to stream at 16 MB/s native to only perform at 3 MB/s.

Tape drive

The tape drive is the fifth piece in determining backup and restore performance. HP tape drives have varying levels of performance. Factors such as file size (larger is better), directory depth, and data compressibility all affect system performance. Data interleaving during backup also affects restore performance. Use of the router and its connections to HP StorageWorks tape libraries is a simple way to scale backup performance.

Table 3 shows performance information for various tape drives.

Table 3: Tape drive throughput speed (native)

Tape Drive	Throughput MB/s
Ultrium 460	30
Ultrium 230	15
SDLT 160/320	16
SDLT 110/220 GB	11
DLT8000 40/80 GB	6

Note: The calculated native performance is provided by the drive vendor and may not be achievable by some configurations.

High availability



3

For information on configuring Microsoft, HP-UX, and Tru64 clusters, refer to the EMC Legato NetWorker Administrator's Guide for your operating system available at:

<http://legato.com/support>

This guide provides information on how to install and configure EMC Legato NetWorker to work with different clustering solutions.

Clustered EBS configuration

The EBS with EMC Legato NetWorker supports HP HP-UX Serviceguard clusters, HP Alpha TruClusters, and Microsoft clusters.

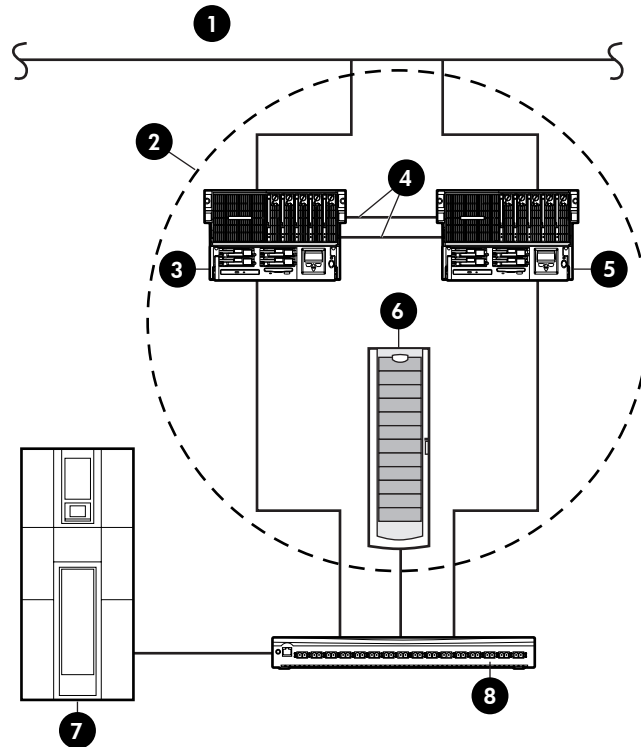


Figure 2: Clustered server EBS configuration

- | | |
|---|-------------------------|
| ① Ethernet | ② Cluster servers |
| ③ EMC Legato NetWorker server node 1 | ④ Private Ethernet link |
| ⑤ EMC Legato NetWorker server node 2 | ⑥ RAID array storage |
| ⑦ HP tape library with embedded FC Interface Controller | ⑧ FC SAN Switch |

Known issues with workaround

4

This section contains known issues with specific integration components in an EBS with EMC Legato NetWorker. These issues and the workarounds described in this section are also documented in HP Engineering Advisories.

Issue

JNI HBA driver 5.3 (for JNI FCE6460, JNI FCX-6562, JNI FCX2-6562) does not function properly with Legato `inquire` command to discover devices; causes library integration issues in Enterprise Backup Solutions (EBS).

Description

JNI driver 5.3 does not function properly with Legato `inquire` or `jbconfig` commands to discover devices. At system boot EMC Legato NetWorker loads a driver called *lus* that uses HBA parameters to determine how to poll or loop through the SCSI bus for devices during its inquiry on EMC Legato NetWorker `inquire` and `jbconfig` commands. The `inquire` and `jbconfig` commands use SCSI inquiry to discover all SCSI devices. The result of inquiry with `jbconfig` is used for automation library configuration with EMC Legato NetWorker software. In this situation the system creates logical devices that can be accessed via UNIX commands, `tar`, `mt`, `dd`, and so on. However the *lus* driver fails to create its own logical for the library, thus the `inquire` and `jbconfig` commands fail to scan the library. Successful inquiry of devices has to occur for the library to be used with the EMC Legato NetWorker application.

This issue occurs on a Sun Solaris server with a FCE-6460, FCX-6562 or FCX2-6562 HBA using driver version 5.3 in an EBS configuration.

Workaround

From the Sun Solaris server do the following:

1. Download the latest *lus.conf* from the Legato web site link below. Place this file in `/usr/kernel/drv`.
<http://portal2.legato.com/resources/compatibility/lanfree.cfm>
2. Edit the file `/kernel/drv/jnic146x.conf` and change the line that reads “`automap=2;`” to “`automap=1;`”. Add the line ‘`tape-changer=“lus”;`’ to the end of this file.
3. Add ‘`name=“lus” parent=“jnic146x” target=0 lun=0;`’ to the end of `/usr/kernel/drv/lus.conf`.
4. Reboot the system. Consult the JNI documentation for instructions on how to achieve static binding and/or LUN-level zoning for your site.
5. Issue command `drvconfig; devfsadm -c tape`. This relinks tape devices if necessary.

Issue

EBS configurations with EMC Legato NetWorker, Sun Solaris 9, and Sun SG-XPCI2FCQF2 HBAs require additional manual configuration steps.

Description

The Sun Solaris driver for HBA -XPCI2FC-QF2 (X6768A) may not display devices on LUNs, however the st (Solaris standard tape) driver connects to tape devices on LUNs resulting in logical devices being created out of order. In this configuration the EMC Legato NetWorker `inquire` command, which validates the presence and configuration order of tape and robotics, will not discover devices in Enterprise Backup Solutions.

Workaround

Rather than configuring tape devices in the logical order of the device specific files, (i.e. “/dev/rmt/0cbn, /dev/rmt/1cbn, /dev/rmt/2cbn etc.), ensure that the devices on this server are aligned with the same logical device as defined by other servers on the SAN.

To avoid I/O errors and conflict of picker source versus targets when multiple servers share a device, perform the following steps before executing `jbconfig`:

1. Perform integration procedures as defined in the EBS Design Guide (see section for the x6768 HBA).
2. From a terminal command line execute `cdi_inq -f` on each device special file (/dev/rmt/0cbn, /dev/rmt/1cbn etc.).
Example: `cdi_inq -f /dev/rmt/0cbn`
3. Collect device serial number for each device.
4. For each Sun Solaris server with the x6768 HBA perform steps 1, 2 and 3 above.
5. If all servers in this EBS have the x6768 HBA go to next step. Otherwise, if you have servers in the EBS w/o the x6768 HBA execute the EMC Legato NetWorker `inquire` command on them. The `inquire` command also displays the device serial number. Use this information to align and order devices during the `jbconfig` procedure.
6. Configure the Legato library jukebox using the serial numbers collected in Step 3 above, making sure you align the correct device special file from each server based on serial numbers and/or the output information from EMC Legato NetWorker `inquire` on a server with an HBA different from the x6768.

Additional resources



The HP StorageWorks Enterprise Backup Solution web site has many useful white papers, tech notes, blueprints, and related user guides to assist in using backup software solutions in an EBS environment. View this information at: <http://www.hp.com/go/ebs>

HP guides

- *HP StorageWorks Enterprise Backup Solutions Design Guide*
- *HP StorageWorks Enterprise Backup Solution with EMC Legato NetWorker 7 Implementation Guide (this guide)*
- *HP StorageWorks SAN Design Guide*
- *HP StorageWorks E2400-160 FC Interface Controller User Guide*

Legato resources

Visit the Legato support web site at <http://www.legato.com/support>. This site includes:

- Searchable Knowledge Base
- Technical documentation
- Download Zone

To view product documentation, go to:

<http://www.legato.com/resources/manuals/>

Error Message Guide:

http://web1.legato.com/infodev/publications/errormsg/7.1/errormsg_7.1.pdf

Windows Install Guide:

http://web1.legato.com/infodev/publications/NetWorker/WINDOWS/7.1/winig_7.1.pdf

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